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New *Awatrechus* (Coleoptera, Trechinae) from the Northwestern Peripheries of the Range of Generic Distribution

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Abstract Four new species of anophthalmic trechine beetles belonging to the genus *Awatrechus* are described from the northwestern peripheries of the range of generic distribution. Three of them, named *A. misatonis*, *A. occidentalis* and *A. sancticaveae*, occur in two mine adits and a shale cave, all lying on the right side of the Yoshino-gawa River, and the remaining one, *A. simplicior*, is upper hypogean at a high elevation of the Tsurugi Mountains west of the known localities of the other congeners occurring on the same mountain range.

In the present paper, I am going to describe four new species of *Awatrechus* occurring at the northwestern peripheries of the distributional range of the trechine genus. All of them are distinctive, and the western three are particularly interesting in forming their own lineage by sharing a peculiar conformation of their male genitalia. Two of the four species, to be named *A. misatonis* and *A. occidentalis*, have so far been known from abandoned adits of copper mines, one to be named *A. sancticaveae* from a shale cave, and the other, *A. simplicior*, from the upper hypogean zone. The first three species are distributed along the right side of the Yoshino-gawa River, while the last one occurs at a high elevation of the Tsurugi Mountains west of all the other known localities of congeners on the same mountain range.

It has taken me a long time to make up my mind to describe the new species before a thorough revision of *Awatrechus*. There was a difficult problem concerning the taxonomy of the *pilosus* complex, and more and more materials were needed from various places in its range, most of which were not easily accessible. Even now, there remain blank areas in our knowledge about the exact distribution of the members of this genus, above all in the Iya-gawa drainage area at the northwestern part. However, it has become preferable to introduce at least distinctive new species into science, and though the purpose of this paper is limited to descriptions of four northwestern forms, there is at least another distinctive new species known from the southern periphery of the distributional range of the genus, which will be described in a separate paper.

The abbreviations employed in the present paper are the same as those explained in previous papers of mine (*e.g.*, UÉNO, 1969, p. 195).

In searching for various forms of *Awatrechus*, most of which are by no means

abundant, I have received hearty and consistent support and co-operation from Messrs. Morisato KIUCHI and Masataka YOSHIDA, to whom I wish to acknowledge my deepest indebtedness. Hearty thanks are also due to the following colleagues and friends for their help in field works and supplying invaluable materials for my study: Drs. Yoshiaki NISHIKAWA and Shinzaburo SONE, the late Messrs. Akiyoshi ISHIDA and Masazi UOZUMI, and Messrs. Yoshiyuki ITÔ, Tetsuo KAWASAWA and Toshiki MOHRI.

Awatrechus misatonis S. UÉNO, sp. nov.

(Figs. 1–3)

Length: 3.65–4.45 mm (from apical margin of clypeus to apices of elytra).

Closely allied to *A. bisetiger* S. UÉNO (1973, p. 183, figs. 2–5) from Inbé-no-ana Cave in view of close similarity of male genitalia, but recognized at first sight on the ample elytra devoid of the posterior dorsal pore on the 5th stria.

Colour usually a little lighter than in *A. bisetiger*, though similar to the latter in some individuals; pubescence and microsculpture as in *A. bisetiger*. Head smaller than in *A. bisetiger* on an average, with genae gently and more evenly convex; antennae reaching four-ninths to five-ninths from bases of elytra, usually about middle. Pronotum as in *A. bisetiger*, though the basal part is usually a little longer, widest at about or a little before three-fourths from base, and constricted at a level between two-ninths and two-sevenths (usually at about one-fourth) from base; PW/HW 1.36–1.50 (M 1.44), PW/PL 0.94–1.10 (M 1.02), PW/PA 1.34–1.44 (M 1.39), PW/PB 1.32–1.46 (M 1.39), PA/PB 0.94–1.05 (M 1.00); sides more strongly arcuate in front, a little more strongly narrowed towards ante-basal sinuation, and then more or less divergent towards hind angles, which are acute and postero-laterally protrudent; front angles obtuse or narrowly rounded and slightly advanced.

Elytra large and broad, usually widest at about middle, sometimes a little behind that level, with broad proximal and round apical halves; EW/PW 1.62–1.76 (M 1.68), EL/PL 2.47–2.67 (M 2.58), EL/EW 1.45–1.56 (M 1.50); shoulders distinct though usually obtuse, sometimes obtusely tuberculate; prehumeral borders less oblique than in *A. bisetiger*, usually straight or nearly so; sides either straight or slightly emarginate behind humeri, then rather strongly arcuate to apices, which are rather widely and conjointly rounded; dorsum convex, steeply declivous at the sides; basal depression distinct, delimited on each side by obtuse carina at the base of interval 5; striae clearly impressed, finely crenulate, almost entire though shallower at the side than on the disc, 1–3 deepened in basal depression, 8 deeply impressed behind the middle set of marginal umbilicate pores; apical striole deeply impressed, feebly curved anteriad, and directed to stria 5; intervals flat, each bearing a somewhat irregular row of suberect pubescence; stria 3 with or without setiferous dorsal pore, at about basal 1/6 if present; stria 5 with a single setiferous dorsal pore at 1/4–2/7 from base; preapical pore located at the apical anastomosis of striae 2 and 3 at about or behind the level of the terminus of apical striole and usually more distant from apex than from suture.

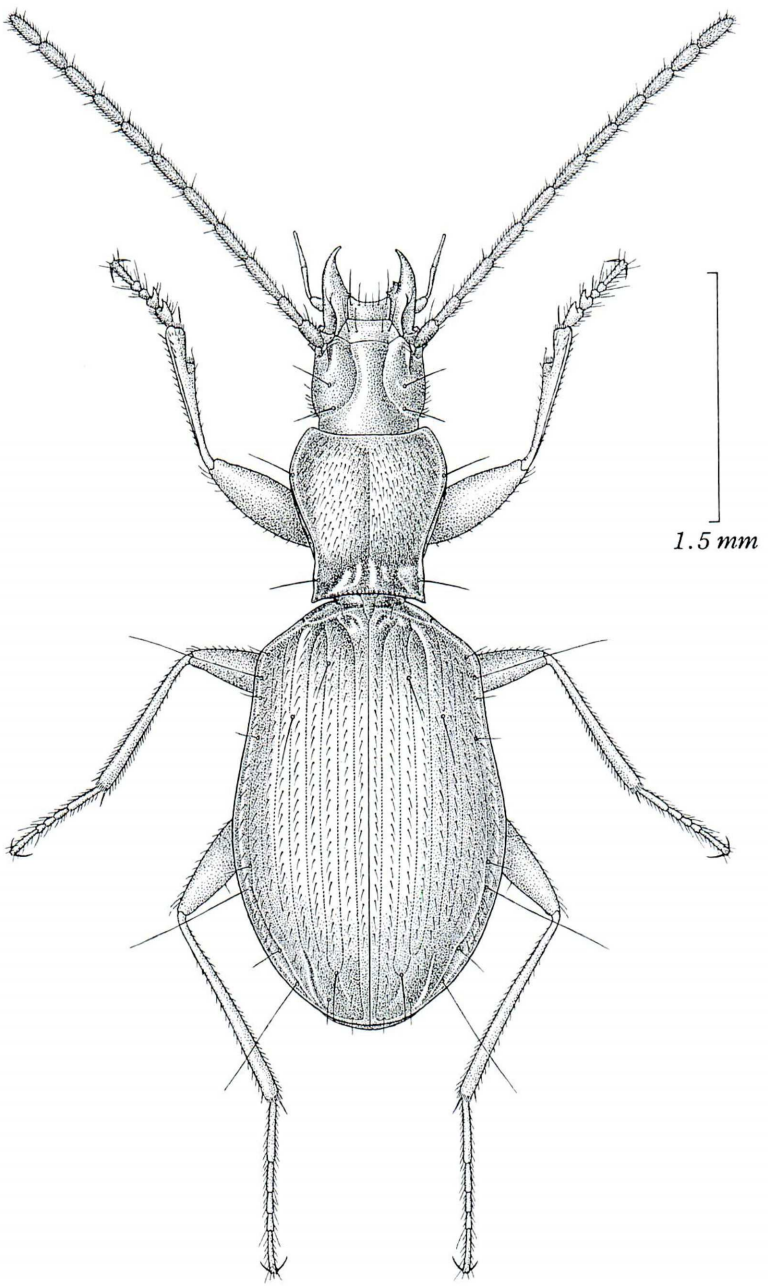
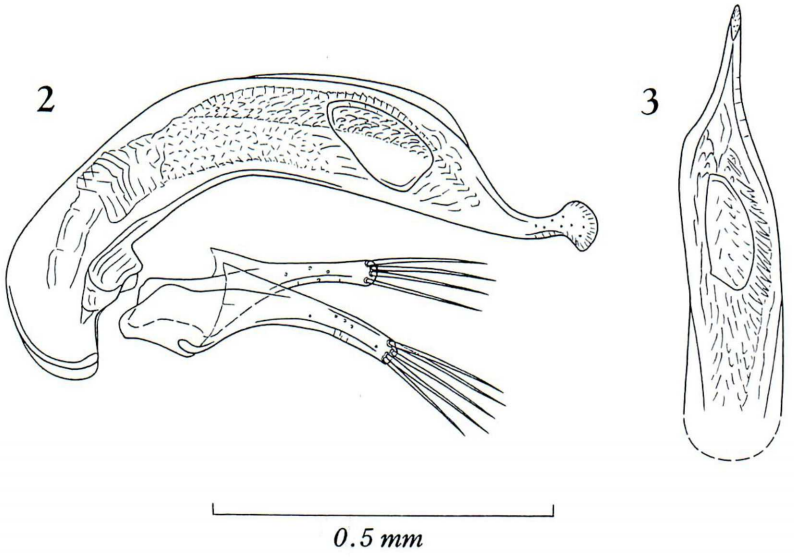


Fig. 1. *Awatrechus misatonis* S. UÉNO, sp. nov., ♂, from a prospecting adit at Nakagoi in Misato-son.



Figs. 2–3. Male genitalia of *Awatrechus misatonis* S. UÉNO, sp. nov., from a prospecting adit at Nakagoi in Misato-son; left lateral view (2), and apical part of aedeagus, dorso-apical view (3).

Ventral surface and legs as in *A. bisetiger*.

Aedeagus closely similar to that of *A. bisetiger* in many respects, that is, in general configuration, shape and size of apical disc and copulatory piece, and disposition of longitudinal patch of sclerotized teeth, but shorter, three-eighths as long as elytra, with shorter and more strongly upcurved stalk of apical disc, and shorter longitudinal teeth-patch composed of smaller and obviously less differentiated teeth. Styles broader, left style bearing atrophied ventral apophysis; each style usually provided with four long apical setae, which are sometimes supplemented with an extra seta on one style.

Type series. Holotype: ♂, 23–VIII–1981, S. UÉNO leg. Allotype: ♀, 3–VIII–1981, Y. NISHIKAWA leg. Paratypes: 1♂, 1♀, 24–V–1981, M. KIUCHI & M. YOSHIDA leg.; 2♂♂, 1♀ (incl. teneral 1♂, 1♀), 23–VIII–1981, M. YOSHIDA & A. ISHIDA leg.; 3♂♂, 3♀♀ (incl. teneral 1♂, 1♀), 23–VIII–1981, S. UÉNO & S. SONE leg. (found in baited traps set by Y. NISHIKAWA on 3–VIII–1981); 12♂♂, 14♀♀ (incl. teneral 3♂♂, 6♀♀), 24–I–1982, M. YOSHIDA leg. (found in baited traps set by S. UÉNO, S. SONE & M. YOSHIDA on 23–VIII–1981). All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Prospecting adit at Nakagoi, 450 m in altitude, in Misato-son of Tokushima Prefecture, eastern Shikoku, Southwest Japan.

Notes. This is the northernmost peripheral species of the genus, whose habitat is only 6 km apart from the main course of the Yoshino-gawa River. It has been known so far from only an abandoned prospecting adit of a copper mine located on the right side of the Kurara-gawa, a branch of the Kawata-gawa River that empties into the Yoshino-

gawa. The adit is 12.9 km distant to the north-northeast in a beeline from Inbé-no-ana Cave, the type locality of *A. bisetiger*, and 16.9 km distant to the north by west from Tôgen-daiichi-dô Cave, that of *A. pilosus* S. UÉNO (1957, pp. 212, 214, figs. 28–29; 1969, p. 196; 1973, p. 183).

As is suggested from the geographical situation of the type locality, *A. misatonis* is doubtless close to *A. bisetiger*. This is clearly indicated by the close similarity of their male genitalia, which become only weakly differentiated. On the other hand, the two species are remarkably different in external morphology, above all in the configuration and chaetotaxy of the elytra. Loss of the posterior dorsal pore on the fifth stria is unknown in any other species of the genus, and instability of the internal dorsal pore is also quite exceptional. It is true that a rare reversion of the pore on the third elytral stria has been known in *A. hygrobius* S. UÉNO, which is normally devoid of it (cf. UÉNO, 1973, pp. 188–189). In *A. misatonis*, however, it is difficult even to determine which state is dominant. I have selected a pair with the setiferous dorsal pores of both the internal and external series as the holotype and allotype of *A. misatonis*, since specimens of this type are more numerous than those lacking the internal pore on one or both the elytra. An exactly identical instability of the setiferous dorsal pore of the internal series has been known in *Trechiama instabilis* S. UÉNO, an upper hypogean species endemic to a small isolated hill called Zôzu-san about 48 km distant to the north-northwest from Nakagoi (cf. UÉNO, 1981, pp. 12–14).

The prospecting adit at Nakagoi is excavated from a corner of terraced cultivated fields, extends almost straight for about 20 m, and is widened at several points. *Awatrechus misatonis* occurs in those widened spots, under stones lying at wet corners, but is seldom found out by naked eyes. However, it was more frequently caught by baited traps set in the same places, which seems to suggest that the ordinary habitats of the beetle are not in the artificial adit itself but somewhere in the fissures of shale surrounding it.

Awatrechus sancticaveae S. UÉNO, sp. nov.

(Figs. 4–5)

Length: 4.30 mm (from apical margin of clypeus to apices of elytra).

Not unlike *A. bisetiger* in general appearance, but the prothorax is larger, with the sides more strongly arcuate, the elytra are more elongate, with the shoulders less prominent and the prehumeral borders more oblique, and the 3rd elytral stria bears a setiferous dorsal pore near the base. Strikingly different from *A. bisetiger* in the conformation of male genitalia as will be described later.

Coloration, pubescence and microsculpture as in *A. bisetiger*. Head generally similar to that of *A. bisetiger*, but the genae are less convex, particularly at the posterior parts; antennae fairly long, reaching the middle of elytra. Pronotum large, much wider than head, about as wide as long, widest at three-fourths from base, and more gradually narrowed towards base than towards apex; PW/HW 1.49, PW/PL 1.02,

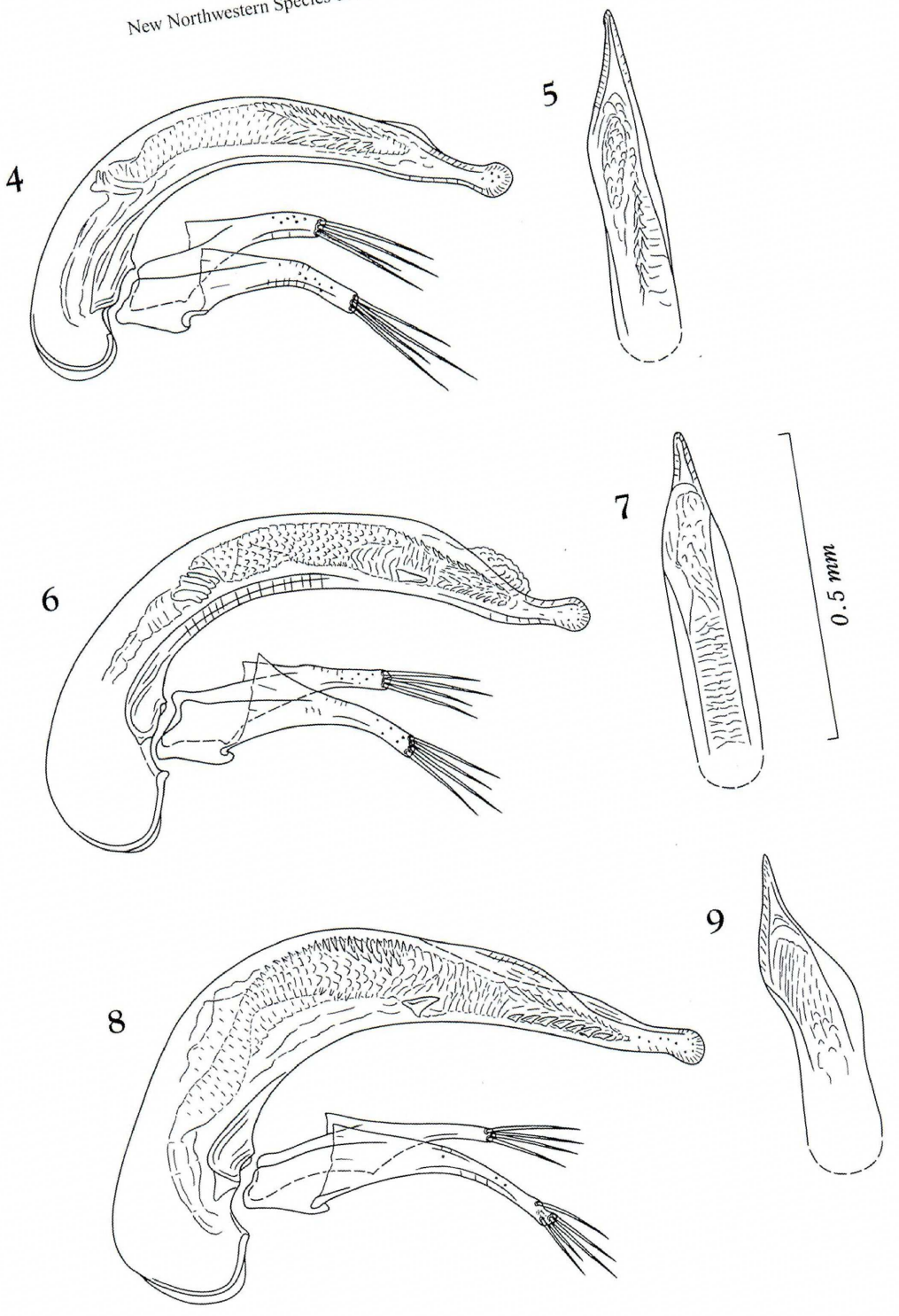
PW/PA 1.46, PW/PB 1.46; apex as wide as base, PA/PB 1.00, the latter straight at middle but posteriorly curved on each side; front angles broad, a little produced forwards and rounded; hind angles sharp, produced more posteriorly than laterally; other pronotal features as in *A. bisetiger*.

Elytra oblong-oval, much longer than wide, widest at about middle, and a little more gradually narrowed towards apices than towards bases; EW/PW 1.56, EL/PL 2.55, EL/EW 1.61; humeral angles obtuse, hardly salient; prehumeral borders oblique and straight; lateral sides briefly straight behind humeral angles, gently arcuate at middle, less so in apical two-fifths, and rather narrowly and conjointly rounded at apices; dorsum moderately convex though longitudinally depressed on the disc and steeply declivous in lateral and apical areas, with a round depression in basal areas, which is delimited on each side by a very obtuse carina formed by the basal portion of interval 5; striae superficial, shallower at the sides than on the disc, stria 8 deeply impressed except before the middle set of marginal umbilicate pores; apical striole deeply impressed, moderately curved, and directed to stria 5; intervals flat, each bearing an irregular row of suberect pubescence; stria 3 provided with a single setiferous dorsal pore at 2/13 from base, stria 5 with two setiferous dorsal pores at 3/11 and 1/2 from base, respectively; preapical pore lying at the apical anastomosis of striae 2 and 3, and much more distant from apex than from suture.

Ventral surface pubescent except for lateral parts. Legs fairly long and slender.

Male genital organ small though somewhat similar in configuration to that of *A. yoshidai* S. UÉNO (1969, p. 196, figs. 3–11); markedly different from the latter in the much smaller apical disc of aedeagal apical lobe, more extensive teeth-patch covering the inner sac, and above all, in the absence of recognizable copulatory piece. Aedeagus slender, only one-third as long as elytra, regularly arcuate though more strongly so before middle than behind, and slightly tapered from behind middle towards apical lobe in lateral view; basal part not ventrally bent and devoid of conspicuously produced parameral articulation; basal orifice very small, with the sides briefly but deeply emarginate; sagittal aileron very narrow and hyaline; viewed dorsally, apical part slightly twisted to the right, with nearly symmetrical apical lobe which is narrow and gradually tapered to nearly pointed extremity; viewed laterally, apical lobe slightly constricted before terminal disc, which is small and ventrally leaned; in profile, ventral margin rather deeply emarginate in proximal half, less so behind middle, and very slightly convex at the base of apical lobe. Inner sac wholly covered with minute scales in proximal half and with large sclerotized teeth behind middle, especially on the ventral side; copulatory piece not recognizable. Styles relatively short and broad with downcurved apical parts; left style longer than the right and devoid of distinct ventral apophysis; each style provided with four thin apical setae various in length.

Figs. 4–9. Male genitalia of *Awatrechus* spp.; left lateral view (4, 6, 8), and apical part of aedeagus, dorso-apical view (5, 7, 9). —— 4–5. *A. sancticaveae* S, UÉNO, sp. nov., from Higao-no-anazenjô Cave in Handa-chô. —— 6–7. *A. simplicior* S. UÉNO, sp. nov., from Nakahigashi-yama on the Bunsui Range. —— 8–9. *A. occidentalis* S. UÉNO, sp. nov., from Tanioku-kô Adit in Ikeda-chô.


4
5
6
7
0.5 mm
8
9

Female unknown.

Type specimen. Holotype: ♂, 5–V–1979, Akiyoshi ISHIDA leg. Deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Further specimen examined. Remains of pronotum and hind body (without apical part of abdomen), 5–XI–1978, M. YOSHIDA leg. (NSMT).

Type locality. Shale cave called Higao-no-anazenjô, 630 m in altitude, at Higao of Handa-chô in Tokushima Prefecture, eastern Shikoku, Southwest Japan.

Notes. This is a very interesting species not directly related to any congeners previously described, though it cannot be discriminated as a representative of a different group from the members of the *pilosus* lineage in external morphology alone. As will be dealt with on later pages, however, its close relatives occur at a height of the Tsurugi Mountains 18.7 km distant to the south by west and in an abandoned mine adit located on a hill distant to the west by south for about 22 km. This seems to mean that other species of the same lineage still remain undiscovered in the hilly area between the Iya-gawa River and the main course of the Yoshino-gawa River.

It was most unexpected that this new species lacks recognizable copulatory piece in the inner sac of its male genitalia. Whether the sclerite is really missing or concealed in the teeth covering the inner sac is difficult to determine. In the following two species, *A. simplicior* and *A. occidentalis*, existence of a small copulatory piece is accompanied by slight disorder of minute scales in the surrounding part, so that the small sclerite can be detected without difficulty, particularly in *A. occidentalis*. In *A. sancticaveae*, however, such a disorder of minute scales cannot be observed anywhere on the inner sac, and therefore I have concluded that the copulatory piece has not become differentiated in this new species.

Higao-no-anazenjô is a vertical crack of a large shale cliff less than 10 m long. Its entrance section is very narrow, and the small cave is only slightly broadened even at the innermost. Accordingly, the cave fauna is very poor in the number of both species and individuals. The present trechine beetle was first found out as the remains of the prothorax and hind body, and succeeding investigations yielded only one male specimen in a perfect condition. The cave is 15.8 km distant to the west-northwest from Inbé-no-ana Cave, the type locality of *A. bisetiger*.

The specific name of this new species is derived from the name of its type cave, Higao-no-anazenjô, which might be loosely translated as the Sacred Cave of Higao. It was regarded by Buddhists as a sacred place, and was frequently visited by pilgrims in former times.

Awatrechus simplicior S. UÉNO, sp. nov.

(Figs. 6–7, 10)

Length: 4.10–4.15 mm (from apical margin of clypeus to apices of elytra).

Belonging to the same lineage as *A. sancticaveae*, and readily recognized on its

large head, long basal part of pronotum, very obtuse humeral angles of elytra, and relatively short stout legs. Decidedly different from *A. sancticaveae* also in the configuration of male genitalia as will be described later.

Coloration, pubescence, chaetotaxy and microsculpture as in *A. sancticaveae*; sometimes (in the paratype), the colour of body is wholly dark reddish brown. Head large, as wide as long, with genae gently and evenly convex, not particularly tumid at the posterior parts; antennae fairly stout but not particularly short, reaching the middle of elytra, pedicel the shortest, about a half as long as antennomere 3 or 4, each of which is about 3.5 times as long as wide, 5–10 gradually decreasing in length towards apex, terminal antennomere about as long as antennomere 6.

Pronotum subcordate, wider than head, about as wide as long, widest at about four-fifths from base or slightly behind that level, and more contracted at base than at apex, with long basal part which sometimes occupies one-third the median length; PW/HW 1.35–1.38 (M 1.36), PW/PL 1.00–1.01 (M 1.00), PW/PA 1.35–1.39 (M 1.37), PW/PB 1.43–1.52 (M 1.47); sides briefly but strongly arcuate in front, nearly straightly convergent posteriad at middle, widely sinuate at about basal fourth, and then either subparallel or slightly divergent towards hind angles, which are either sharp or acute and protrudent posteriad or postero-laterad; apex a little wider than base, PA/PB 1.04–1.10 (M 1.08), with front angles obtuse, narrowly rounded and slightly advanced; base nearly straight at middle and posteriorly curved on each side; other pronotal features as in *A. sancticaveae* and *A. bisetiger*.

Elytra subovate, widest at the middle, and a little more gradually narrowed towards apices than towards bases; EW/PW 1.58–1.60 (M 1.59), EL/PL 2.41–2.45 (M 2.43), EL/EW 1.53–1.55 (M 1.54); humeral angles more or less tuberculate though the prominence is variable with individuals; prehumeral borders moderately oblique, usually somewhat emarginate but rarely straight; sides briefly straight behind humeri, then gently or moderately arcuate, and rather widely and conjointly rounded at apices; dorsum convex, steeply declivous in lateral and apical areas, with a round depression in basal areas delimited on each side by an obtuse carina formed by the basal portion of interval 5; striae superficial and becoming shallower at the side, finely crenulate, striae 1–3 deepened in basal depression, 6 slight and partially evanescent, 7 and 8 nearly obliterated though the latter is clearly impressed behind the middle set of marginal umbilicate pores; apical striole deeply impressed, moderately curved, and directed to stria 5 at the terminus; intervals flat, each bearing an irregular row of suberect pubescence; stria 3 with a single setiferous dorsal pore at 1/7–1/6 from base, stria 5 with two setiferous dorsal pores at 1/4–2/7 and 1/2–3/5 from base, respectively; preapical pore located at the apical anastomosis of striae 2 and 3 on or just behind the level of the terminus of apical striole, and twice or more distant from apex than from suture.

Ventral surface pubescent as in *A. sancticaveae*. Legs relatively short and stout; protibiae moderately dilated towards apices and slightly arcuate in apical part; metatibia about a half as long as elytra; mesotarsomere 1 as long as mesotarsomeres 2–4 combined; metatarsomere 1 a little shorter than metatarsomeres 2–4 combined; protar-

someres 1–2 rather widely dilated and stoutly produced inwards at the apices in ♂.

Male genital organ relatively large, similar to that of *A. sancticaveae* in basic conformation, but the aedeagus is more strongly arcuate with the apical disc less differentiated, the longitudinal teeth-patch of inner sac is more extensive, and the copulatory piece is recognizable though very small and hardly specialized. Aedeagus slender, two-fifths as long as elytra, regularly arcuate, and nearly parallel-sided in both dorsal and lateral views, with the basal part rather strongly curved ventrad and the apical lobe gently upcurved; parameral articulation not distinctly produced; basal part round, with small basal orifice, whose sides are shallowly emarginate; sagittal aileron vestigial; viewed dorsally, apical lobe very slightly asymmetrical and gradually tapered to nearly pointed extremity; viewed laterally, apical lobe gently upcurved, only slightly narrowed apicad, and gently dilated into a round disc which is not conspicuous; ventral margin widely emarginate in profile, more deeply before middle. Inner sac wholly covered with scales and teeth, the latter of which are enlarged and rather heavily sclerotized in apical fourth; copulatory piece very small, somewhat spatulate with blunt apex, and membraneous in proximal part, lying at the ventral side of inner sac at about apical third of aedeagus. Styles with slender apical parts, left style longer than the right, each bearing four apical setae.

Type series. Holotype: ♂, allotype: ♀, 1,420 m alt. on SSW slope, 20–X–1990, Y. ITÔ leg. Paratype: 1 ♂, 1,400 m alt. on SW slope, 4–VI–1989, Y. ITÔ leg. All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Nakahigashi-yama on the Bunsui Range, 1,400–1,420 m in altitude on the southwestern and south-southwestern slopes, in Monobé-mura of Kôchi Prefecture, eastern Shikoku, Southwest Japan.

Notes. Judging from its relatively thickset body with stout appendages, *A. simplicior* may be the least specialized species within the genus *Awatrechus*. Besides, its primitiveness is suggested by the conformation of its male genitalia, which are relatively unmodified and devoid of well differentiated copulatory piece.

In most eastern species of the genus, the aedeagal apical lobe is highly modified to form a large terminal disc supported by a narrow stalk, and the copulatory piece is usually larger than the apical disc. Only the exception is *A. hygrobius* S. UÉNO (1955, p. 38, figs. 1–2; 1957, p. 212; 1969, pp. 196, 208; 1973, p. 188) occurring at the easternmost part of the generic range, in which the aedeagal apical disc is well developed but the copulatory piece is very small and not comparable in size with those of the other species. The small copulatory piece possessed by *A. simplicior* is nearly of the same size as that of *A. hygrobius* but is sclerotized only in apical half, or in other words it is less completely formed than that of the latter.

Awatrechus simplicior may be a relict species surviving in isolation at a high place of the Tsurugi Mountains. Its habitats are about 25 km distant to the west-southwest in a beeline from Tôgen-daiichi-dô Cave, the type locality of *A. pilosus* and 18.7 km distant to the south by west from Higao-no-anazenjô Cave, that of *A. sancti-*

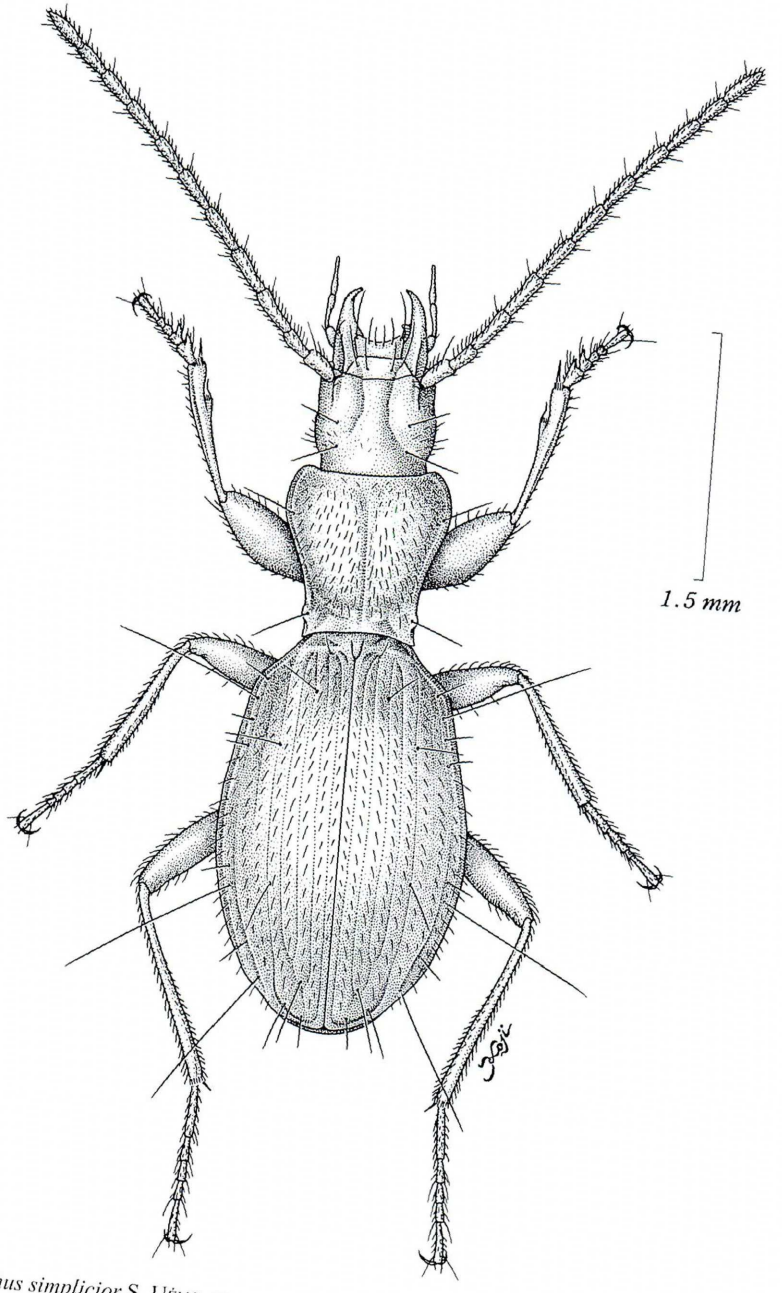


Fig. 10. *Awatrechus simplicior* S. UÉNO, sp. nov., ♂, from Nakahigashi-yama on the Bunsui Range.

caveae, and mark the westernmost point of the distribution of *Awatrechus* on the watershed of the Tsurugis. The known localities of the other two new species belonging to the same lineage are much lower in elevation than the type locality of *A. simplicior*, though one of them is farther apart to the northwest.

The type locality of this new species, Nakahigashi-yama, is the northernmost head of the Bunsui Range, which is the main southward branch of the Tsurugi Mountains and forms the borders of Tokushima and Kôchi Prefectures. The trechine beetle was found at two stations on the Kôchi side of the summit (1,685 m in height), from screes in a deciduous broadleaved forest fed by narrow streams. The habitats were typically upper hypogean, being near the bedrock beneath thick covers of rock debris.

Awatrechus occidentalis S. UÉNO, sp. nov.

(Figs. 8–9, 11)

Length: 4.00–4.45 mm (from apical margin of clypeus to apices of elytra).

Externally very close to *A. sancticaveae* and indistinguishable from it with confidence, but definitely different in the size and configuration of male genitalia.

Identical with *A. sancticaveae* in the coloration, pubescence, chaetotaxy and microsculpture. Head perfectly similar to that of *A. sancticaveae*. Pronotum also similar to that of *A. sancticaveae* with similar standard ratios, only differing in the curvature of lateral sides, which are more briefly and more strongly arcuate on an average; PW/HW 1.45–1.49 (M 1.47), PW/PL 0.98–1.03 (M 1.00), PW/PA 1.41–1.49 (M 1.44), PW/PB 1.44–1.54 (M 1.47), PA/PB 1.00–1.05 (M 1.03). Elytra slightly broader and more clearly striate than in *A. sancticaveae*, though mostly identical with those of the latter; EW/PW 1.54–1.58 (M 1.56), EL/PL 2.39–2.49 (M 2.43), EL/EW 1.52–1.59 (M 1.56); pore on stria 3 located at 1/7–1/6 from base, those on stria 5 at about 2/7 and 3/5 from base, respecively. Legs somewhat slenderer than in *A. sancticaveae*.

Male genital organ similar in basic conformation to that of *A. sancticaveae*, though considerably different from the latter in many details. Aedeagus larger, nearly two-fifths as long as elytra, highest and strongly arcuate at about basal third, and gradually tapered from there towards apical orifice; apical part sigmoidally twisted to the right in dorsal view, with narrow symmetrical apical lobe pointed at the extremity; viewed laterally, apical part twisted, with apical lobe very slightly upcurved and gently dilated into a ventrally leaned terminal disc of a similar size to that of *A. simplicior*; basal part not large, straight, devoid of conspicuously produced parameral articulation, with small basal orifice, whose sides are moderately emarginate; sagittal aileron very narrow and hyaline; ventral margin widely emarginate in profile, much more deeply so before middle than behind. Inner sac wholly covered with scales and teeth as in *A. simplicior*, but the teeth are obviously larger and more heavily sclerotized in apical part and at the dorsal side of proximal third; copulatory piece very small though larger than in *A. simplicior*, subtriangular with nearly pointed apex, and moderately sclerotized, lying at the ventral side behind middle. Styles slender and fairly long, with very slen-

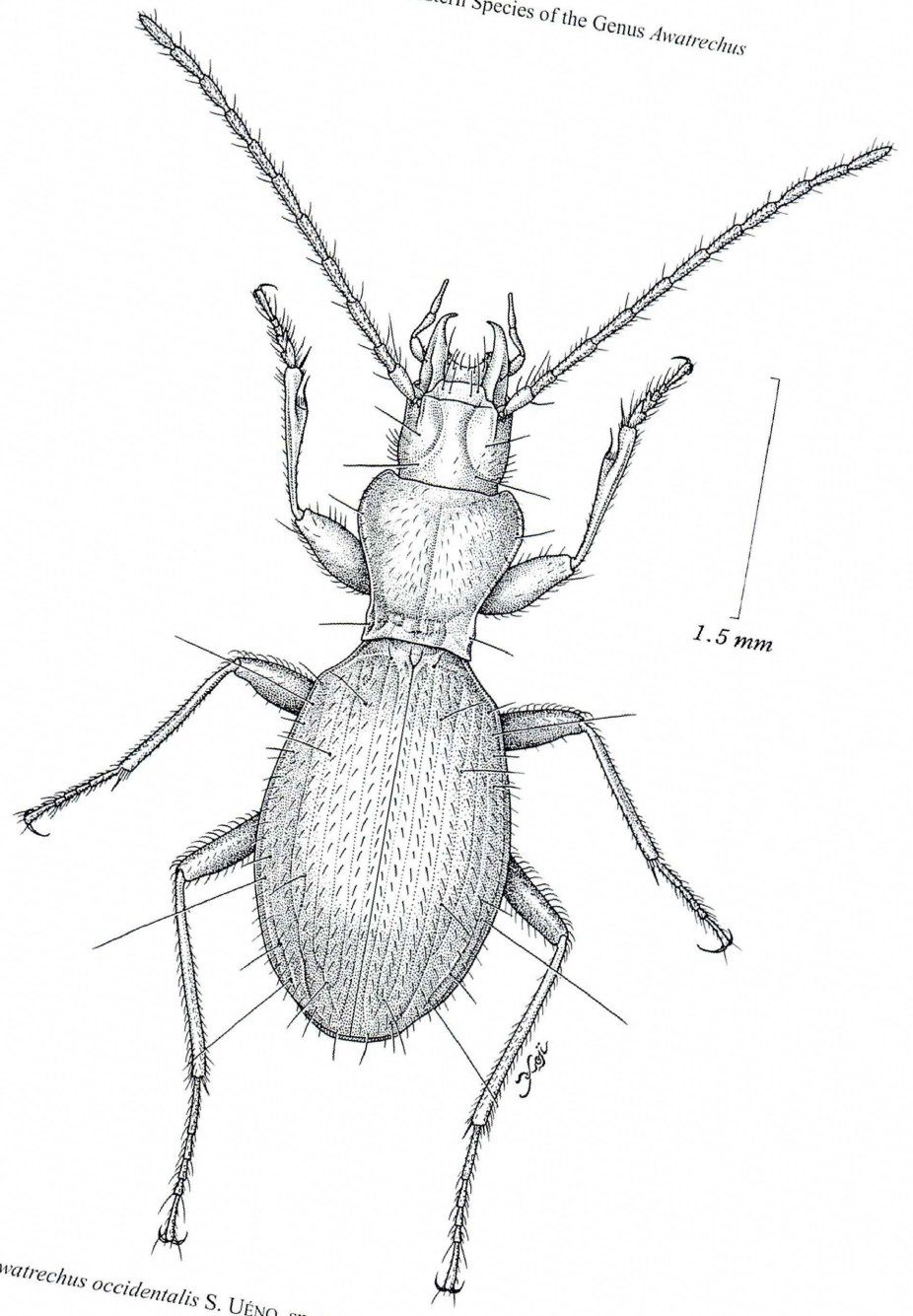


Fig. 11. *Awatrechus occidentalis* S. UÉNO, sp. nov., ♂, from Tanioku-kô Adit in Ikeda-chô.

der apical parts, left style obviously longer than the right, each usually bearing four thin apical setae, which are sometimes supplemented with a short extra seta on one style.

Type series. Holotype: ♂, allotype: ♀, paratypes: 3♂♂, 1♀ (teneral), 1–XII–1985, M. YOSHIDA leg. All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Abandoned adit of a copper mine, called Tanioku-kô, 530 m in altitude, at Ishinouchi of Ikeda-chô of Tokushima Prefecture, eastern Shikoku, Southwest Japan.

Notes. Though geographically isolated, this new species is almost identical with *A. sancticaveae* in external features and cannot be correctly discriminated without dissection of males. Contrary to external morphology, the male genitalia are quite unique, above all in the peculiar configuration of the aedeagus, which is almost rectangularly curved at about basal third and sigmoidally twisted to the right at the apical part. Also the copulatory piece is in a more completed state than in the other species of the same lineage, and comparable with that of *A. hygrobius* in the size, position and sclerotization. This similarity may have been brought about by convergence, but is still interesting because the parallel evolution has taken place in the westernmost and easternmost species of the genus.

The type locality of this remarkable new species is an abandoned adit of a copper mine lying to the south of the town of Ikeda on the right side of the main course of the Yoshino-gawa River. It is 22.1 km distant to the west by south from Higao-no-anazenjô, the type locality of *A. sancticaveae*, and about 27 km distant to the northwest from Nakahigashi-yama on the Bunsui Range, that of *A. simplicior*. The mine is located at the southeastern side of a low hill 622 m in height. From the entrance, the adit leads to a rather spacious room which leads off a passage with a shallow pool of underground water and heaps of bats' excreta standing up from it. The trechine beetle occurs in the room and was found from beneath stones lying near the edge of the underground water.

要　　約

上野俊一：アワメクラチビゴミムシ属分布域の北西部に産する4新種．—— アワメクラチビゴミムシ属の未記載種のうち，属の分布域の北西部に固有の4新種を正式に記載し，これらにミサトメクラチビゴミムシ *Awatrechus misatonis* S. UÉNO, ヒガオメクラチビゴミムシ *A. sancticaveae* S. UÉNO, モノベメクラチビゴミムシ *A. simplicior* S. UÉNO, およびイケダメクラチビゴミムシ *A. occidentalis* S. UÉNO の新名を与えた．

最初の種は，吉野川の右岸に位置する廃坑から見つかったもので，既知種のインベノメクラチビゴミムシ *A. bisetiger* S. UÉNO に類縁が近いが，上翅の形態や剛毛式がいちじるしく異なっている．次の種は，上記の2種の生息地より西方に位置する頁岩洞に固有で，雄交尾器の基本的な構造が，ミサトメクラチビゴミムシを含めた既知の7種のいずれのものとも異なる．とくに，中央片先端部の円盤状拡張部があまり発達していないことと，交尾片が認められないこと

は，この新種の特異性を際立てるものである．3番目の種は地下浅層性で，剣山地の高所に局在し，雄交尾器の構造からみてヒガオメクラチビゴミムシと同系列のものだろうと考えられるが，小さい交尾片をもつ点で異なっている．ただし，この交尾片は分化がきわめて悪く，大型の鱗片に見誤られる程度の大きさしかない．

最後のイケダメクラチビゴミムシは，吉野川が北から東へ屈曲する付近の右岸に位置する廃坑から発見されたもので，ほかのどの種の産地からも直線距離で20 km以上へだたり，剣山地の主稜からも遠く離れた位置に孤立している．しかし，外部形態ではヒガオメクラチビゴミムシとほとんど異ならず，雄交尾器の基本的な構造はモノベメクラチビゴミムシの場合と同じで，同系列の新種だと考えざるをえない．ただし，交尾片の発達は，同系列の既知の3種のうちではもっともよく進んでいて，同様に小さい交尾片をもつリュウノメクラチビゴミムシの場合に匹敵する．ヒガオメクラチビゴミムシあるいはモノベメクラチビゴミムシの生息地とイケダメクラチビゴミムシの基準産地とのあいだには，ナガチビゴミムシ属*Trechiama*の盲目種以外にメクラチビゴミムシ類のまったく知られていない地域がかなり大きく残されているので，将来この地域から，同じ系列の別の新種の発見される可能性が高い．

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Occurrence of *Yamautidius anaulax* (Coleoptera, Trechinae) in the Upper Hypogean Zone

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Yamautidius (*Miyamaidius*) *anaulax* S. Uéno (1978, pp. 200, 203, figs. 4–5) is a small anophthalmic trechine beetle originally described from two males collected in 1978 in a